National Spent Nuclear Fuel Program

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Providing for safe, efficient disposition of DOE spent nuclear fuel

NSNFP Roles & Responsibilities

- Primary interface between EM SNF and RW
- Advocate for SNF in the DOE complex
  - Risk reduction by providing for road-ready disposable storage system
- Manage DOE SNF repository-related activities
- Qualify EM SNF site QA programs
- Integration of technology development needs

What the NSNFP Role Has Not Included

- Direction of site SNF activities or inter-site activities
- Funding site SNF activities
- Ownership of any SNF
- Maintenance or storage of any SNF
- Loading SNF
- Characterization of SNF

Regulatory Drivers/Issues

- Disposal - 10 CFR 63
  - Risk-informed performance-based
  - EM strategy for licensing does not directly rely on waste form performance
- Transportation - 10 CFR 71
  - Degraded fuels will likely require repackaging
  - Existing facilities cannot load rail casks
- Interim storage - 10 CFR 72
- Quality assurance - Consistent with 10 CFR 50, Appendix B
  - EM has data on all fuels but none compatible with modern NRC QA standards

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EM/RW Memorandum of Agreement (MOA) for Acceptance of DOE SNF and HLW

- Signed by EM-1 and RW-1 (Aug/Sept 1998)
- Terms and conditions for federal agencies equivalent to the NWPA and Standard Contract for commercial utilities
- Seeks to achieve safe and timely disposal of DOE SNF & HLW
- Identifies EM and RW responsibilities
  - Majority of EM responsibilities are jointly shared by the NSNFP and the DOE SNF sites

Ongoing RW/EM Tasks Supporting Disposal

- EIS input, review, and consultation
- Design trade studies
- Total system performance assessment
- Criticality analysis
- Design basis events
- Features, events, and processes
- Source term development
- Licensing and certification strategy
- Safeguards and security

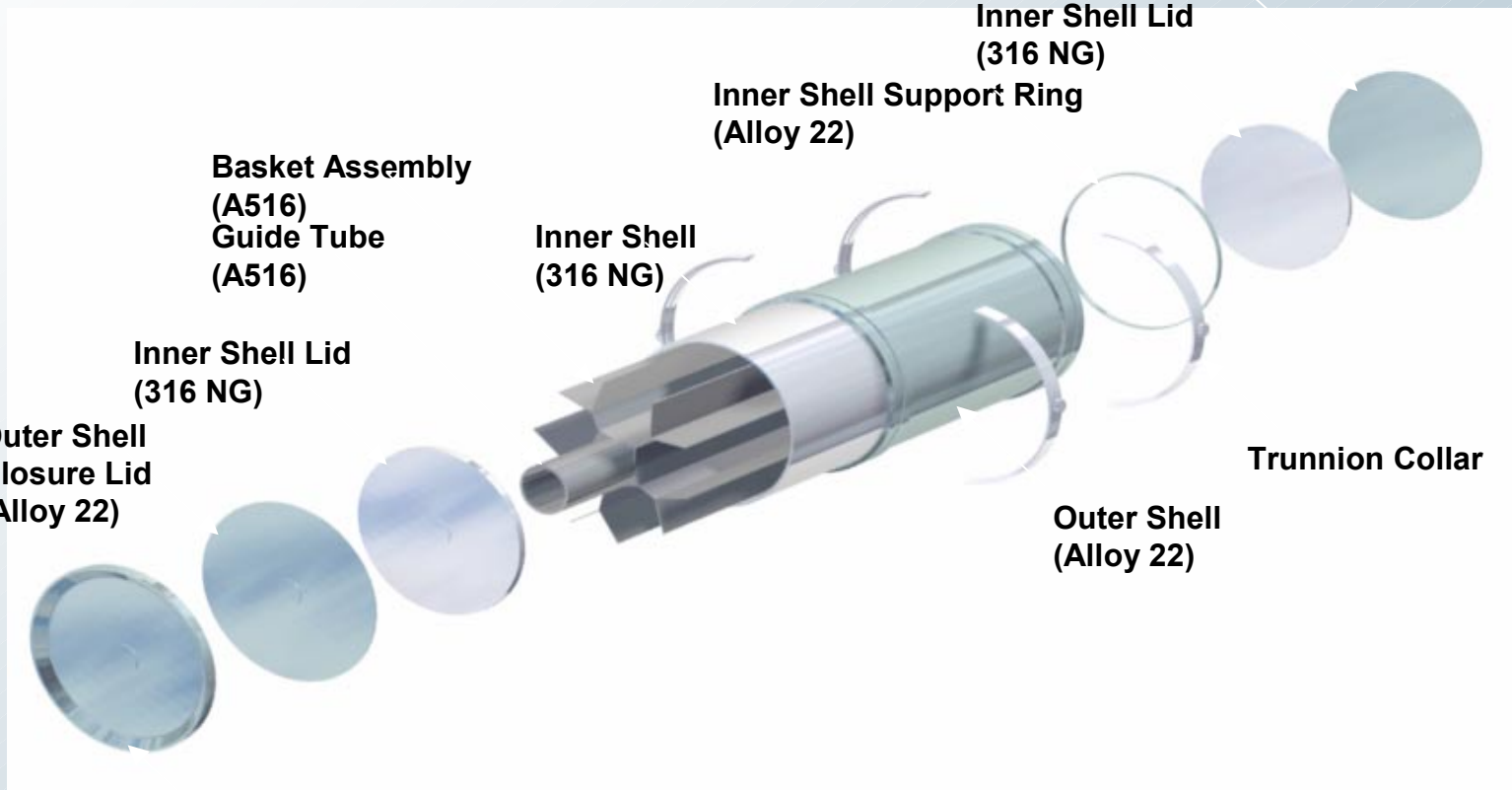
Why Is there a Standardized DOE SNF Canister?

- The advantages of a standardized canister for DOE SNF disposal were recognized (RW, sites, NSNFP consensus)
  - Assigning safety significance to canister verses waste form saves characterization costs
  - Fewer shipments; straightforward cask certification
  - Direct emplacement in WP at repository; one handling fixture
  - Needed for deployment of neutron absorbers

Co-disposal with HLW Provides a Cost-effective Solution for Highly Enriched SNF

- Uses existing interstitial spaces in high-level waste packages
- Eliminates any reliance on waste form for preclosure safety at repository
- Reduces total fissile material content in WP
- Greatly simplifies transportation and preclosure criticality analyses

SNF/HLW Co-Disposal Package



Licensing & Certification
Purpose and Need

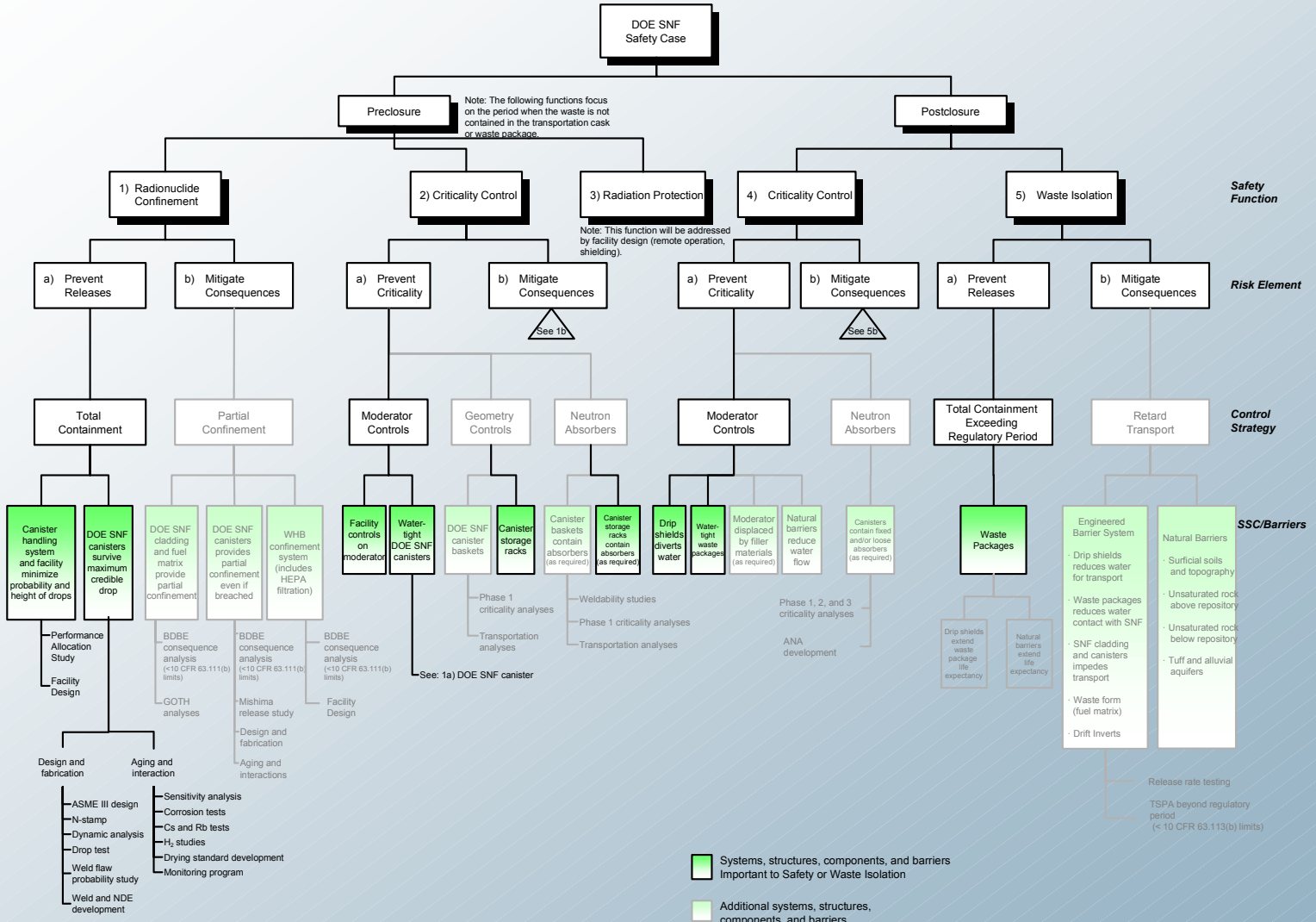
Repository disposal of DOE SNF in the most expedient and effective manner.

- Provide consistent working basis
- Focus limited resources on most important activities
- Consider licensing strategy impacts on certification and vice versa
- Ensure high confidence of DOE SNF acceptance

NSNFP Disposal Strategy Overview

- Both licensing & certification are considered
- Risk-informed performance-based approach
- Minimal reliance on DOE SNF information
- Additional measures provide defense-in-depth
- Strategy is flexible
- Considerable progress has been made

DOE SNF Licensing and Certification Strategy



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Issues/Opportunities

- What can the NSNFP do to support HQ activities
  - Life-cycle cost analyses
  - Standardized canister impact analyses
  - Complex-wide integration
- Relationship with DOE-RW/HQ and the YMPO

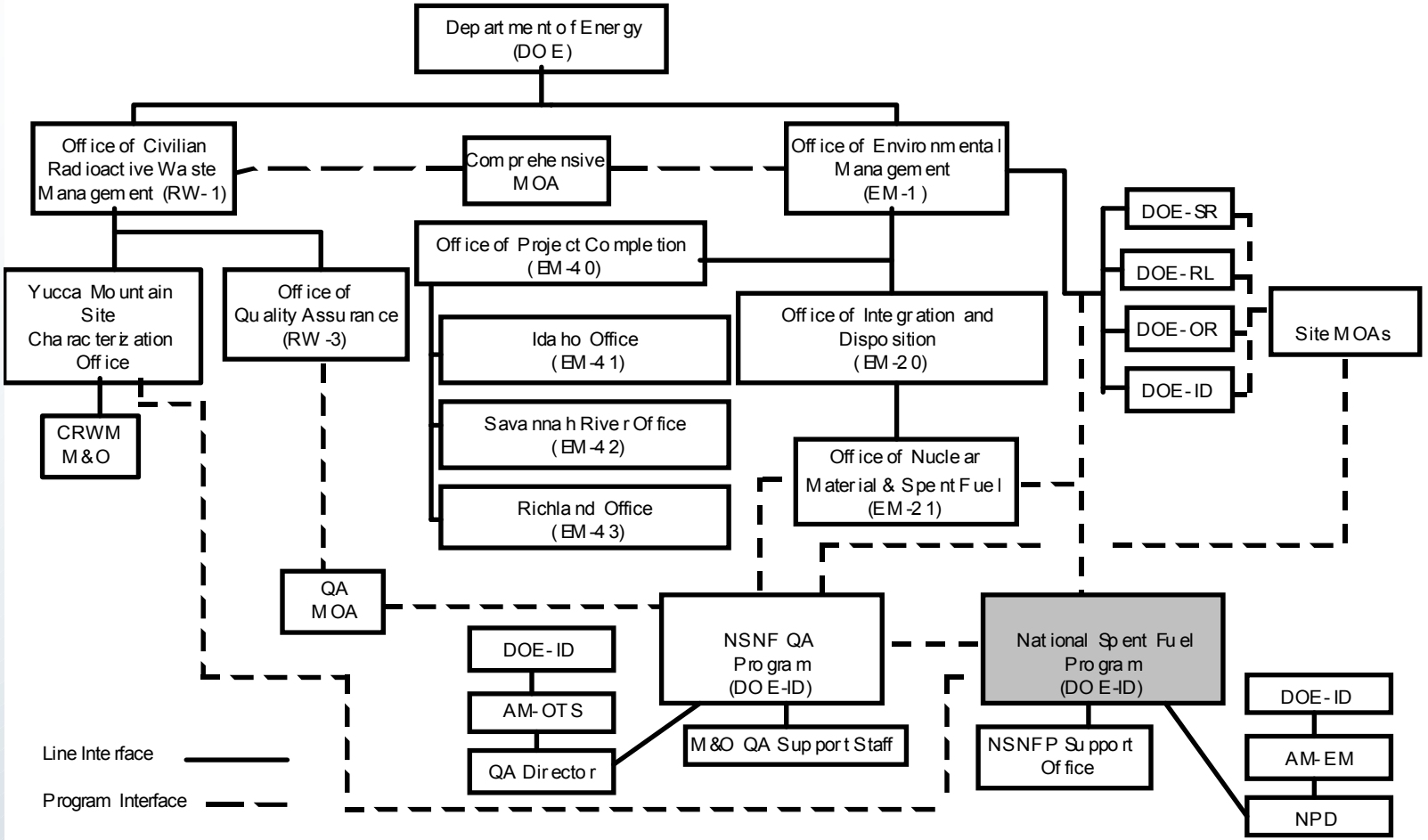
Summary

- The NSNFP has been effective in advancing a national solution to DOE SNF disposition
- A centralized effort to direct SNF disposal will
  - Allow for earliest shutdown of existing facilities
  - Reduce long-term risks to the EM program

Backup Slides

- EM interface slide (16)
- Inventory (17-18)
- Licensing & Certification (19-24)
- Standard Canister (25-29)

National Spent Nuclear Fuel Program Interfaces



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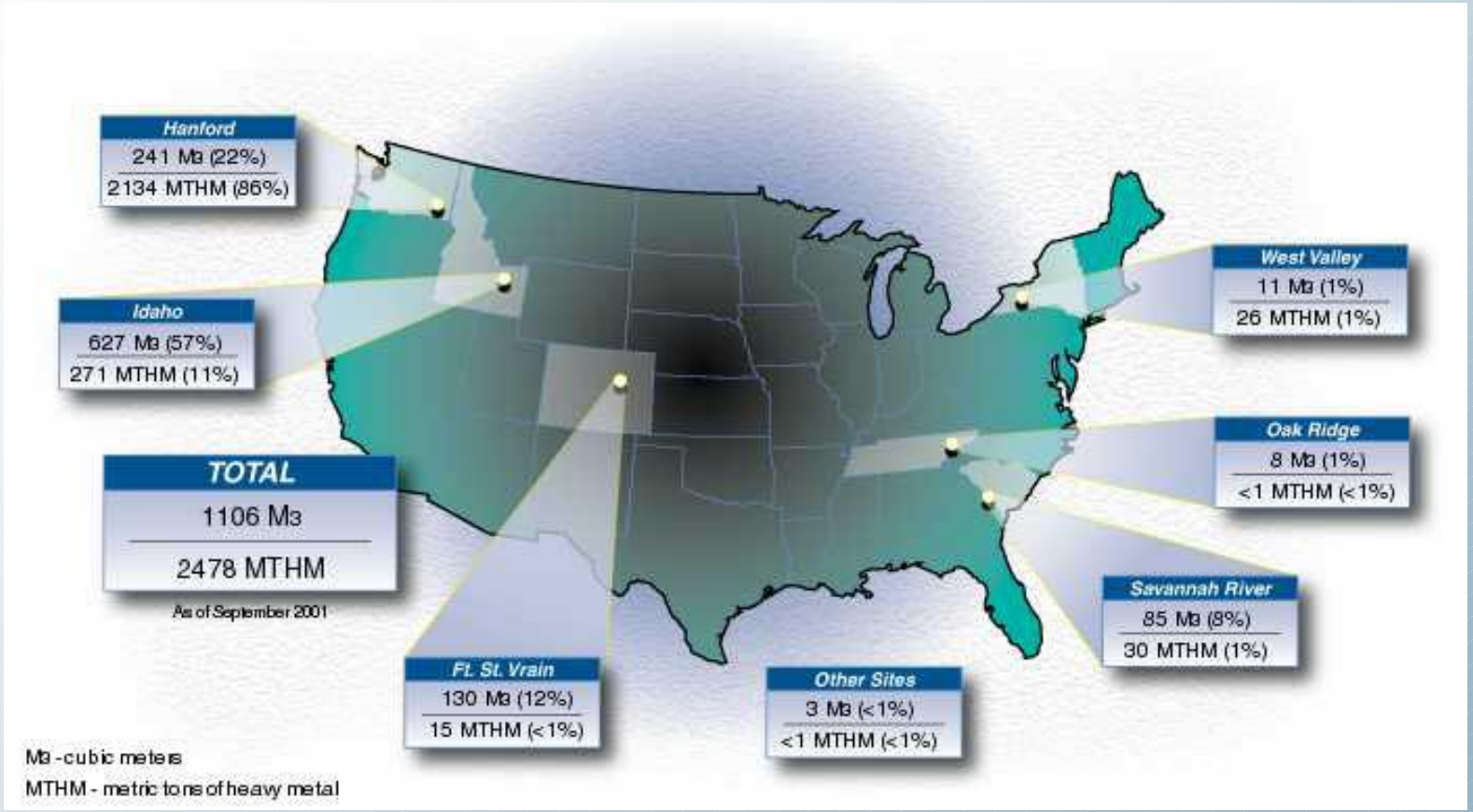
Spent Fuel Inventories by Site



Spent Fuel Inventories by Major Site

Site	Fuel Type	Volume (M3)	MTHM
Hanford	N Reactor (U Metal with Zirc Cladding)	205	2100
	FFTF (MOX with SST Cladding)	23	11
	Commercial (UO_2 with Zirc Cladding)	8	16
	Single Pass Reactor (U Metal with Alum Cladding)	0	3
	Other fuel types (mostly UO2 with Zirc or SST Cladding)	5	4
	Totals	241	2134
Idaho	Commercial (UO_2 with Zirc Cladding)	181	125
	Naval	145	20
	EBR-II & FFTF (U, Pu Metal, MOX with Zirc Cladding)	8	26
	FSVR & Peach Bottom Graphite (ThC2-UC2 with Graphit Cladding)	98	12
	Shippingport LWBR (ThO2-UO2 CERAMIC) with Zirc Cladding	25	43
	Alum based fuel [ATR, HFBR] (UAlx & U_3O_8 with Alum Cladding)	24	2
	FERMI (U Mo with Zirc Cladding)	7	38
	TRIGA	2	0
	Other fuel types (mostly UO_2 with Zirc or SST Cladding)	137	6
	Totals	627	271
SRS	DOE Experimental & Misc fuel (PuO_2 or MOX with SST or Zirc Cladding)	2	2
	Thorium based fuels [Dresden & ERR] (ThO_2 UO_2 with SST Cladding)	4	7
	HWCTR (U Metal with SST or Zirc Cladding)	3	7
	Alum based fuels [FRR & DRR] (UAlx, U_3Si_2, or U_3O_8) with Alum Cladding	73	7
	HWCTR, CVTR, etc. (UO_2 with SST or Zirc Cladding)	3	6
	Totals	85	30
West Valley	Big Rock Point (UO2 with Zirc Cladding)	5	11
	Robert E. Ginna (UO2 with Zirc Cladding)	6	15
	Totals	11	26

Licensing and Certification Strategy Summary

- Ensures an achievable, effective, and cost efficient approach for EM
- Focuses on items important to safety and waste isolation
- Meets performance criteria using engineered barriers instead of DOE SNF information
- Provides additional defense-in-depth measures

Learning from the WIPP Experience

- Waste information collected initially considered adequate for disposal
- Waste characterization requirements lacked legal or safety basis
- Licensing decisions were made without understanding the impacts on certification
- Changing the certification requirements after licensing is difficult

Pre-Closure Radionuclide Confinement

- Important to Safety
  - Minimize drop
  - No canister breach if dropped
- Additional Measures
  - Canister provides partial confinement
  - Cladding/matrix minimize release
  - HEPA filters
  - Releases below limits

Pre-Closure Criticality Control

- Important to Safety
  - Dry facility
  - No canister breach
  - Canister storage racks
- Additional Measures
  - Geometry controls
  - Neutron absorbers
  - Shielded facility
  - Partial confinement provided by canister
  - Minimize release due to retention by cladding/matrix
  - HEPA

Post-Closure Criticality Control

- Important to Safety
  - Waste package
  - Drip shields
- Additional Measures
  - Geometry controls
  - Neutron absorbers
  - Canister
  - Natural barriers

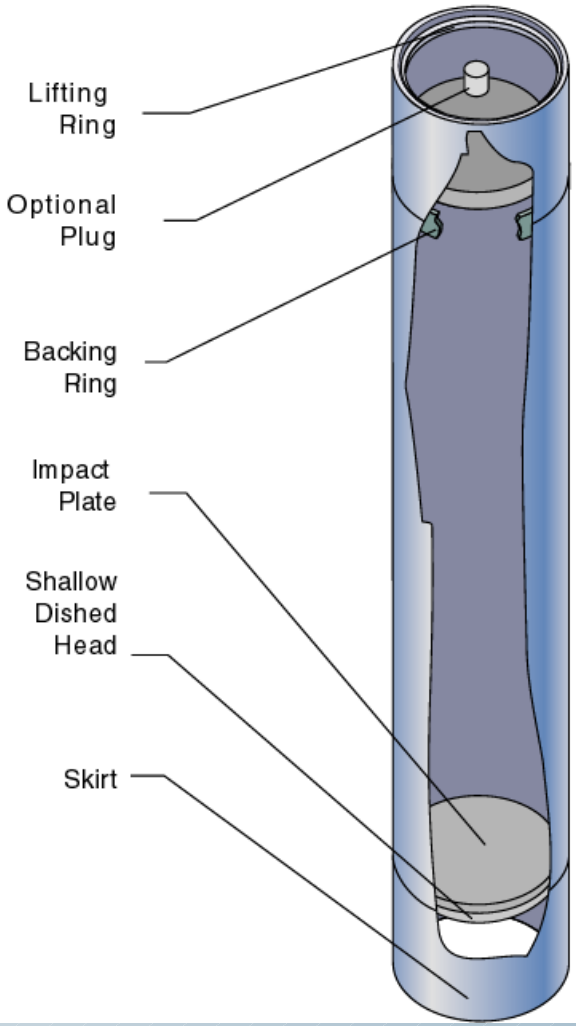
Post-Closure Waste Isolation

- Important to Safety
  - Waste Package
- Additional Measures
  - Engineered barriers
    - Drip shield
    - Canister, cladding, matrix
    - Drift inverts
  - Natural barriers
  - Releases below limits

Canister Drivers

- Memorandum of Agreement (MOA) for Acceptance of Department of Energy Spent Nuclear Fuel and High-Level Radioactive Waste between the Assistant Secretary for Environmental Management and the Director of the Office of Civilian Radioactive Waste Management, Rev. 1, January 1999
- NSNFP decision to develop standardized canister to simplify handling of DOE SNF and resultant cost savings of handling operations at multiple sites and at repository
- Robustness of standardized canister key to licensing strategy
- Integrated Interface Control Document, Volume 1, DOE/RW – 051, being updated

Standardized DOE Spent Nuclear Fuel Canister



Nominal Outside Diameters:
18 in. and 24 in.

Wall Thickness:
3/8 in. for 18 in. canister
1/2 in. for 24 in. canister

Maximum Weight with Fuel:
5,000 to 10,000 lbs.

External Lengths:
Short Canister: 118.11 in.
Long Canister: 179.92 in.

Material:
Canister Body: SS316 L

GT00 0119

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Standardized DOE SNF Canister

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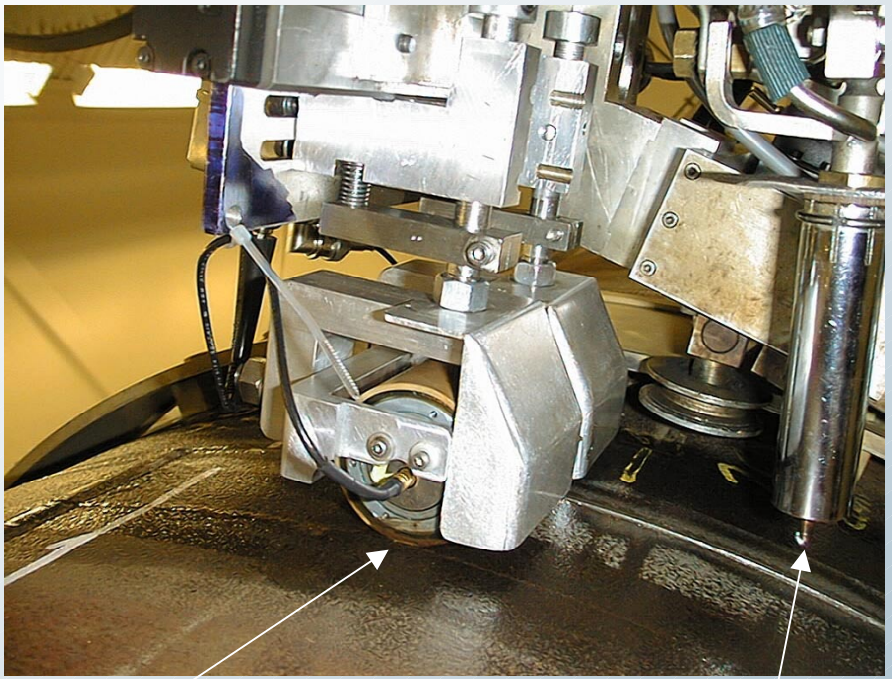
Developing Remote Welding and NDE Capabilities



- Needed for final closure welds in high-radiation fields
- Minimal heat input for welding and repair
- Provide full visual, surface, and volumetric inspection
- Real-time nondestructive examination

Significance to Standardized Canister Deployment

- Alternative standardized canister closure weld is a manual weld setup and repair
- Shield plug (8 to 11 in. thick) required for personnel access into cell
- Inclusion of shield plug in standardized canister design will result in increased count of canisters to repository
- Packaging cells need to allocate space for remote welding equipment